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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,099	01/04/2005	Ryoji Hoshi	122336	9147

25944 7590 07/26/2006

OLIFF & BERRIDGE, PLC  
P.O. BOX 19928  
ALEXANDRIA, VA 22320

EXAMINER
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HITESHEW, FELISA CARLA

ART UNIT	PAPER NUMBER
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1722

DATE MAILED: 07/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/520,099

Applicant(s)

HOSHI ET AL.

Examiner

Felisa C. Hiteshew

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 12-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 24-39 is/are allowed.
- 6) ☒ Claim(s) 12-23 and 40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date see attached paper.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Information Disclosure Statement***

The PTOL 1449 has been received, reviewed and considered.

***Claim Rejections - 35 USC § 112***

2. Claims 12, 24 and 40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 12, lines 4-5 the terminology "void-type" is being considered vague and indefinite.

In claim 24, line 7 the terminology "void-type" is being considered vague and indefinite.

In claim 40, lines 5-6 the terminology "void-type" is being considered vague and indefinite.

The addition of the word "type" to an otherwise definite expression extends the scope of the expression to render it indefinite. *Ex Parte Copenhaver*, 109 USPQ 118 (Bd. App. 1955).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 12-23 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura, et al '362 (WO 01/27362 A1) in view of Japanese Abstract 2001-274167.

Kimura, et al '362 A1 teaches a silicon single-crystal wafer and a CZ method of making the same, wherein the wafer is doped with nitrogen and the whole surface is a V-rich region or in which the wafer is doped with nitrogen, an OSF region is provided in the surface, the LEP density in the OSF region is 20 pieces/cm<sup>2</sup> or less the OSF density in 1 x 10<sup>4</sup> pieces/cm<sup>2</sup> or less. A substrate for an epitaxial wafer having few crystal defects is produced in the epitaxial layer when epitaxial growth on a CZ silicon single-crystal is doped with nitrogen.

The difference being that a slicing or "cutting" step is not taught by Kimura, et al '362 A1.

Japanese Abstract '2001-274167 teaches a silicon single-crystal wafer being obtained by cutting a silicon single crystal which contains nitrogen at a concentration of

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$> 1 \times 10^{13} / \text{cm}^3$ . When an epitaxial layer is caused to deposit on the wafer, an occurrence of stacking faults is reduced to  $< 0.5 \text{ defect} / \text{cm}^2$  or dislocations over the whole surface of the wafer is reduced to  $< 0.5 \text{ dislocations} / \text{cm}^2$ . It would have been obvious to one of ordinary skill in the art to modify and optimize the product and method teachings, as taught by the Kimura, et al '362 A1 reference, to be enhanced by the teachings of the Japanese Abstract '167. The motivation being the production of high quality silicon single-crystals that have superior device characteristics and excellent IG ability for producing them.

A reference is good not only for what it teaches by direct anticipation but also for what one of ordinary skill might reasonably infer from the teachings. In re Opprecht 12 USPQ 2d 1235, 1236 (CAFC 1989); In re Bode 193 USPQ 12; In re Lamberti 192 USPQ 278; In re Bozek 163 USPQ 545, 549 (CCPA 1969); In re Van Mater 144 USPQ 421; In re Jacoby 135 USPQ 317; In re LeGrice 133 USPQ 365; In re Preda 159 USPQ 342 (CCPA 1968).

***Allowable Subject Matter***

6. Claims 24-39 are allowed.
7. The following is an examiner's statement of reasons for allowance: The most relevant prior art of reference was the art submitted by the applicants. However, they do not teach nor fairly suggest singularly or in any combination thereof a method for producing a silicon wafer for epitaxial growth wherein a silicon wafer for epitaxial growth is produced by growing a silicon single crystal with doping nitrogen according to the CZ method, with controlling F/G ( $\text{mm}^2/\text{min} \times \text{K}$ ) in the range of 0.30 or more where F

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(mm/min) is a range of crystal growth and  $G$  (K/mm) is a temperature gradient near growth interface when the silicon single crystal is grown, and with controlling a passage time (min) at 1150 to 1050°C in the range of 40 minutes or more, in the region wherein at least the center of the wafer becomes  $V$  region in which the void defects are generated, and then slicing the grown silicon single crystal.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Felisa Hiteshew whose telephone number is (571) 272-1463. The examiner can normally be reached on Mondays through Thursday from 5:30 AM to 4:00 PM with Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta, can be reached on (571) 272-1316. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-1463.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see

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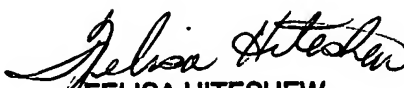
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<http://pair-direct.uspto.gov>. Should you have questions on access to the Private

PAIR system, contact the Electronic Business Center (EBC) at 866- 217-9197

(toll-free).

  
FELISA HITESHEW  
PRIMARY EXAMINER  
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